tools and bushings which are to be used. The bushings should be numbered or marked in some way so as to facilitate the selection of the correct bushing for the particular tool with which it is used. If this system is put in force and used for simpler classes of jigs also, the operator will need few or no instructions from the foreman, outside of this operation sheet.

Designing Open Jigs. — The present chapter will be devoted to explaining and illustrating the application of the principles previously outlined, to the simplest and most common design of drill jig — the open jig. Assume that the drill jig is to be designed for a piece of work, as shown in Fig. i. Consideration must first be given to the size of the piece, to the finish given to the piece previous to the drilling operation, the accuracy required as regards the relation of one hole to the other, and in regard to the surfaces of the piece itself. The number of duplicate pieces to be drilled must also be considered, and, in some cases, the material.

The simplest kind of drill jig that could be used for the case taken as an example would be the one illustrated in Fig. 2, which simply consists of a flat plate of uniform thickness of the same outline as the piece to be drilled, and provided with holes for guiding the drill. Such a jig would be termed a jig-plate. For small pieces, the jig-plate would be made of machine steel and casehardened, or from tool steel and hardened. For larger work, a machine-steel plate can also be used, but in order to avoid the difficulties which naturally would arise from hardening a large plate, the holes are simply bored larger than the required size of drill, and are provided with lining bushings to guide the drill, as shown in Fig. 3. It would not be necessary, however, to have the jig-plate made from steel, for large work, as a cast-iron plate provided with tool steel or machine-steel guiding bushings would answer the purpose just as well, and be much cheaper. The thickness of the jig-plate varies according to the size of the holes to be drilled and the size of the plate itself.

The holes in the jig in Fig. 2 and in the bushings in the jig in Fig. 3 are made the same size as the hole to be drilled in the work,